

ME 645

Computational Fluid Dynamics II

Syllabus - Spring 2007

Class Schedule

Lecture: M 4:30-7:20PM, CEAS D210

Office Hours: M 3:30-4:30PM, T 6:00-7:00PM (by appointment)

Instructor

William W. Liou, Ph.D.

CEAS G230

(269) 276-3430

william.liou@wmich.edu

http://www.mae.wmich.edu/faculty/liou/wp_course.htm

Course Description

This course introduces the application of numerical methods to the solution of the fluid dynamic equations. The various forms of the equations of fluid dynamics will be derived and discussed. The characteristics of the equations will be studied using their one-dimensional analog. The necessary matrix algebra and eigen-analysis will be reviewed. Modern flux splitting and upwind differencing will be discussed. Coordinate transformation and grid generation will be introduced. FLUENT will be used for a term project.

References

Computational Fluid Mechanics and Heat Transfer, by J.C. Tannehil, D.A. Anderson and R.H. Pletcher, Sec. Ed., Taylor & Francis, 1997, ISBN 1-56032-046-X.

Numerical Computation of Internal and External Flows, by C. Hirsh, 1988, John Wiley & Sons.

Grading

Homework Assignments: 15%

Test #1: 15%

Final Exam: 15%

Computer Assignments: 30%

Term Project: 25%

Tentative List of Subjects

1. Fluid dynamic equations
2. One-dimensional analog
3. Matrix algebra
4. Numerical solutions of one-dimensional equations
5. Flux splitting, upwind difference, center differencing, CE/SE method
6. Coordinate transformation and grid generation

Notes

- (1) No make-up exams will be given for reasons other than documented medical emergencies. In any case, the students must inform the instructor prior to the test. The points for that test will be added to the final exam. If a student misses more than one test, the other test will be graded as zero.
- (2) Solve homework problems on engineering paper. Solve one problem on each page. All the assignments will be collected and graded. Hand in your paper before the class.
- (3) Late homework penalty: 30\% for one day late, 60\% for two days and no credit for more than two days late.
- (4) You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate Catalog that pertain to Academic Integrity. These policies include cheating, fabricating, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Judicial Affairs. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with me if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test.
- (5) In class, beepers and cell phones alike should be turned off. Non-class-related uses of any PC platforms are discouraged.